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Railway Transport Liberalization: A Case Study of Various Countries in the World

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Abstract

Today, the processes of restructuring the railway sector and the liberalization of the railway market change significantly. Vertical separation between infrastructure railway transportation service provision and train operations is a significant key element in the railway liberalization. This paper focuses on a research into railway regulation and liberalization in 30 countries. The aim of this paper is to give a comparative overview of the regulation of railways and analyses the process of the liberalization and restructuring of railways in the 30 countries. We test this theoretical prediction using a data base that contains investment in transport with private participation, transport services information from World Bank. Our final results are valid for the period 1980-2014. Overall, the analyses showed statistically significant interaction effects between railways transportation and transport services and investment in transport with private participation. This study presents new insights in theory, paving the way for further research.

Keywords: railway deregulation, railway transportation, international economics, international trade, regional development and globalization, regional economics, international business, international political economics

1. Introduction

Liberalization, privatization and globalization of economies have led to high level of competition in railway sectors and that transportation sector is growing at an exponential rate and various regulations and directives are particularly seen in this industry (Jupe & Funnell, 2015). Regulations empower to develop railway sector by encouraging competitiveness and market opening. There is no option to restructuring and liberalization of the in various countries railways transportation. It should lead to an increase of the productive use of infrastructure capacities and compose a more integrated service in the international transportation (Bošković & Bugarinović, 2015). Railway operators must have the status of independent operators behaving in a commercial way and adapting to the market needs. At the same time railway operators would be cost savings, a better profile to increase competitive advantage, improve their productivity and develop environmental performance (Beria, Quinet, De Rus, & Schulz, 2012). Effective railway transportation has considerable impacts on economic growth and social development (Busu & Busu, 2015). Railway liberalization and deregulation have an expressive positive influence on cost efficiency and regulations are essential for prevent monopoly exploitation (Jensen & Stelling, 2007).

This paper introduced an institutional approach to railway transport liberalization with a case study for five continents. It presents the results of the railways goods transported (million ton-km), railways passengers carried (million passenger-km), rail lines (total route-km) into railway regulation and liberalization in a variety of countries. It reviews the literature relating to the various countries railway deregulation in order to identify the implementation of railway liberalization.

The railway restructuring has been still proceeding for 30 years and is not completed and majority of research results of railway liberalization in different countries that is no certain conclusion (Grushevska, Notteboom, & Shkliar, 2016). Grushevska, Notteboom, & Shkliar (2016) made a comparison of the Swedish model, The German model, The French model and concluded that the place-dependent of changes in institutional—organizational framework for railway transportation are convenient for Ukrainian Railways. Busu

& Busu (2015) deal with Romanian railway sector and analyzing the impacts of the liberalization process. Bognetti & Fazioli (1999) emphasized prospects in European Railways and the liberalization problems especially network regulation theoretical problems. Bošković & Bugarinović (2015) consider the process of railway liberalization in South-Eastern Europe and defined four sections. These sections involve market institutions and legislation related market institutions and legislation related to the railway sector, restructuring of the incumbent, degree of the railway market liberalization and financial arrangements between the state and actors of the railway market. Jensen & Stelling (2007) present the results of Swedish railway deregulation and clarify the relationship between output and costs in railways goods and passenger transportation. Laurino, Ramella, & Beria (2015) analyzed the economic regulation of railway network in 20 countries and found that open marketing for railway cargo transportation is authorized while different degrees of freedom exist in setting agreements between operators for trackage and haulage rights but effective competition in the market has been very limited in railways passenger transportation. Beria, Quinet, De Rus, & Schulz (2012) reviews a comparative overview of railway liberalization in Italy, Germany, France, Spain and conclude that railway liberalization help to eliminate the barriers and improve competitive advantages. Cowie (2015) found that there is an evidence to have barriers for railway passenger and cargo transportation. The USA experience with railway deregulation was investigated to identify the main factors for British railway privatization. Peláez, Sánchez-Cabezudo, & Kyriakou (2012) consider a process of railway liberalization in European Union and Spain. Alexandersson & Rigas (2013) evaluated to data on the reconstruction of the railway market in Sweden and European Union. Mitra, Sharma, & Véganzonès-Varoudakis (2014) mentioned that infrastructure is a critical factor of performance in India and liberalization enhance to improve productivity and efficiency.

This paper is structured as follows: Section 2 presents the theoretical background of railway liberalization and methodological framework of research; section 3 deals with the analyzing and result of research and finally section 4 concludes of this paper and future research.

2. Theoretical and Methodological Framework

2.1 Theoretical Framework: Railway Liberalization

Railway transportation has been enforced to reform process of liberalization and restructuring in many countries in the world. Governments all over the world have made significant changes in their railways policies since 1980s, a development that set out in Great Britain, Sweden and Germany. Almost all the railway networks in many countries in Europe were nationalized. Railway network was constructed in the second part of the 19th and the first half of the 20th century in many countries. Railway network were closed on account of rising costs and decreasing railway traffic after the Second World War (Merkert & Nash, 2013). Nowadays, private companies are slowly entering in the railway markets. Railway liberalization purposed to open market and anticipates a difference distinction between infrastructure management and railway operations in Europe (Grushevska, Notteboom, & Shkliar, 2016). Railway reforms raised division of infrastructure from operations and supply international access to network for international railways goods transported and railways passenger transported. Infrastructure and train operations are part of the same enterprise, but as distinct department (Gangwar & Raghuram, 2015).

Sweden became the first country in the world to separate the construction and administration of the railway infrastructure legally (Alexandersson & Rigas, 2013). Sweden National Rail Administration was established on 1 July 1988 which is authorized for infrastructure. SJ Further was a responsible for train operations. Railway network was divided into main lines, country lines and infrastructure investment programme. SJ Further had won a passenger transportation rights on main lines and freight transportation rights on all network parts. Additionally country lines were given to different company which name is CPTA. It showed that main lines, country lines and infrastructure were separated for sustainability (Jensen & Stelling, 2007). Companies except government in Sweden have a chance to enter railway market. Enterprising business firms started to manage regional traffic in 1990. Liberalization of railway sectors will improve economic efficiency in terms of reduced costs (Laurino, Ramella, & Beria, 2015).

The impact of rail transport liberalization, the Netherlands has also increased customer satisfaction. From the early 1990s until 2004, there has been a major downward trend in Polish railway passenger transportation. Liberalization of rail transportation was eventuated to enhance reforms along with Poland's membership in the European Union in 2004. The impact of rail transport liberalization, the Netherlands has also increased customer satisfaction. Estonia Railways was founded in 1992 which is a state-owned enterprise after independence. Liberalization of the railways has led to increased efficiency and financial performance in Estonia (Pittman, 2013).

Great Britain has been only initiative to privatize the network in the mid-nineties. Although it is a private enterprise and dependent on government, its debts were taken to guarantee by government (Cowie, 2015).

In Britain and Sweden the economic regulator also regulates safety procedures while assignment of capacity together with the description of network access charges are performed by the Rail Capacity Allocation Office in Hungary while regulatory and safety issues are operated in one organization but independently from each other. In Sweden and Spain the track manager is a part of the State, while in the other European countries investigated the network is directed by a separate government owned company (Peláez, Sánchez-Cabezudo, & Kyriakou, 2012).

In 1990s, the dominance of rail transportation was governed under the State in Switzerland and it hasn't got a system to competition with road transportation. The rail liberalization first reform was actualized in 1996. The results of liberalization, passenger and cargo rail transportation are occurred to increase substantially in Switzerland (Forsberg, 2016).

Rail infrastructure and railway services are operated by public enterprise owned by the Ministry of Public ministry in the Spanish model. Among the countries investigated, the first model is used in Great Britain, Swedenand Spain and in the case of the new line between France and Spain, the second one in France and Hungary while the so called German holding model is utilized in Italy and Austria. The French model was used in Czech Republic, is one of the countries with the world's busiest rail network. This situation has arisen as a result of historical developments. Rail transport liberalization increased in competition and railway infrastructure fees paid by 5 passenger transportation operators and 13 freight operators in Czech Republic. National railway regulatory assignment could be defined to isolate institutions in France, Italy, Germany and Spain (Laurino, Ramella, & Beria, 2015).

Safety regulation, economic regulation, slot allocation and railway infrastructure management are divided among three different institutions. The majority railways remain largely publicly owned in Europe. The first high speed line opened in Italy in 1977. In Italy the owner of FS Holding is responsibility of contracts to the Ministry of Economy at the same time is liable to Ministry of Transport for regulation. The network is directed by local enterprises different from the national operator in Italy and Germany which the division between infrastructure operator and service operator complies with the European laws however the common ownership of the network manager and the train company under a public holding. It is difficult to believe that railway transportation is independent. In Germany Deutsche Bahn AG Holding is inspected by the Federal State. Besides, there is segmentation between the railway operator and the infrastructure manager since the previous performs network maintenance under management agreements with the infrastructure manager in France. The railway operator and the infrastructure manager are completely independent and are not two substations of a holding, is a solely country using a different model is France (Beria, Quinet, De Rus, & Schulz, 2012).

Railway reconditioning has been represented in 2013 in order to readjust the vertically integrated railway company through the division between infrastructure, passenger and freight operations in Turkey (Zeybek, 2012). The government owned railway infrastructure operator and a joint stock company providing railway transportation services are constructed for sustainability. As regards the organizational structure and the process of separation, these practices could be taking into account as completed in in Romania, Bulgaria and Montenegro. In Bulgaria, Independent enterprises are settled for railway infrastructure and transport in 2002. Laterly, it is transformed to holding company which involves three companies: for freight transport, for passenger transport and for train traction. In Romania, Five vertically allocated enterprises are established state-owned enterprise infrastructure manager such as freight operator, passenger operator, company for management of surplus assets and employees. The railway freight operator was privatized by the government of Romania in 2013. In the process of privatization of the railway transport in Montenegro it has achieved an incredible development. A joint stock enterprise with mixed capital was constituted through voucher privatization in 2002. Infrastructure manager was divided from railway transportation in 2008. After this situation, freight and passenger transportation was split into two parts in 2009. Cargo transportation privatization was first venture which failed in 2010 (Bošković & Bugarinović, 2015).

In Macedonia, The infrastructure management and railway operator have been divided in the perpendicular since 2007. Nevertheless the railway transport of goods and passengers have just administrated by same enterprise. Croatia composed a holding organization which involve four enterprise; infrastructure, transport of goods, passenger transport and traction in 2006. In the Croatian government declared an offering for the sale of 70% of shares of the company for the transport of good in 2013 (Bošković & Bugarinović, 2015).

Both in Russia and China divided the management of railways from the government liability. A government

owned national firm was established in last ten years. In Russia railway transportation polices are greatly varied with a series of reforms. A company was founded and government-owned Russian Railways Public Corporation property was made arrangements for a sale to the private sector. The privatization freight railway subsidiary was firstly practiced. It anticipates the privatization passenger railway sector in the future. China opened its first high speed line in 2003. Chinas railway network is now the longest in the World. Before 2013 railway network was administrated by Ministry of Railways and playing an important role for acting railway regulations. Structural reforms were occurred in railways transportation. Ministry of Railways was abolished and transferred policy and planning functions to the Ministry of Transport and Communications. State Railway Administration reorganizes for railway administration. In China and India railway transportation enterprises are vertically combined with the governments definitely controlling all the perspectives of the railway sector (Mitra, Sharma, & Véganzonès-Varoudakis, 2014). The major reform was not occurred in India where the Ministry of Railways sustains to manage the state-owned monopoly. A different structures in railway transportation with national enterprise, local enterprise, private concession and private provision has existed in Australia is a dissimilar country from other countries. Australia differs from the other countries investigated in that it has more than one competent economic regulator evaluating access arrangements and arbitrating arguments among railway operators. Railway network in the United States and Canada were mainly organized for freight transport. Railway network are managed by private freight enterprises (Pittman, 2011).

In Brazil the railway network has been privileged through 12 concessions for a period of 30 years to private freight operators. In Brazil the regulatory institution mainly supervises concession contracts and the transport of passengers and cargo while in Japan, Chile and Mexico regulatory tasks are currently carried out by their respective Ministries of Transport. In Japan, The first high rail line was opened in 1964 for passengers. The 1987 reform introduced the model of horizontal separation through the split of the former public operator into six vertically integrated passenger companies (three private and three public) and a single freight company owned by the government that uses the network of the passengers companies. In Chile, the railway transportation reforms have occurred since nineties. Railway network was combined with Northern Railroad was privatized including mandatory facilities without open-access clauses. It was founded with freight services auctioned to the private sector for the rest of the network a freight concession. Privatization process resulted in three regionally diverse prerogative for the infrastructure awarded to three vertically integrated enterprises in Mexico. Furthermore, a terminal concession equally splinted between the three enterprises and the government was composed to supply competitively-neutral access to all operators into Mexico City railway transportation market. Infrastructure and freight services are integrated in same enterprise on its network. Railway passenger transportation is introduced by a separate company in South Africa (Laurino, Ramella, & Beria, 2015).

2.2 Objective of the Research

Thus, the aim of this study is to answer the questions following. To this end, we clarify the results of a survey of 30 countries in the 5 continents. The value of this analysis derives from the following: (a) Is there a direct positive relationship between railways goods transport and investment in transport with private participation (current US$), (b) Is there a direct positive relationship between railways passenger carried and investment in transport with private participation (current US$), (c) Is there a direct positive relationship between rail lines and investment in transport with private participation (current US$), (d) Is there a direct positive relationship between railways goods transport and transport services (% of commercial service exports), (e) Is there a direct positive relationship between railways passenger carried and transport services (% of commercial service exports), (f) Is there a direct positive relationship between rail lines and transport services (% of commercial service exports).

3. Analyze and Results

Building on previous studies, several key elements of railway liberalization are identified. These key elements of railway liberalization contain in different 30 countries in the world. This study aims to use a case study to analyze these keys elements and impact of railway transportation. The data was derived from World Bank which includes the period of 1980-2014. These countries were selected because they are viewed to restructuring of the railway sector and liberalization of the railway market change.

Even though rail liberalization has been more than thirty years since the restructuring of the railways started; this process is still at its very beginning in the world. This can clarify the need for long preparatory periods for description to liberalization of the railway transportation market.

Table 1 has been examined whether there is a relationship between the railway transportation and investment in transport with private participation, participation transport services in Europe.

In correlation analysis, it has carried out there is a positive relationship between railway goods transported and investment in transport with private participation in Europe Which is selected in process of railway transportation liberalization in Table 1.

Table 1. Correlations between railway transportation and investment in transport with private participation, participation transport services in Europe

Country Name	Correlation	Railways, goods transported (million ton-km)	Railways, passengers carried (million passenger-km)	Rail lines (total route-km)
Croatia	.b	.a	.a	.a
	.c	0.941**; 0.0005	0.313; 0.45	-0.251; 0.548
Macedonia	.b	.a	.a	.a
	.c	0.20; 0.97	0.351; 0.495	.a; 0.005
Bulgaria	.b	0.51; 0.65	0.58; 0.59	-0.13; 0.91
	.c	0.937**; 0.005	0.454**; 0.007	0.845**; 0.008
Switzerland	.b	.a	.a	.a
	.c	0.882**; 0.003	-0.21; 0.60	-0.23; 0.579
Czech Republic	.b	.a	.a	.a
	.c	-0.2408; 0.565	-0.156; 0.711	0.062; 0.882
Germany	.b	.a	.a	.a
	.c	-0.121; 0.773	-0.103; 0.807	0.211; 0.615
Spain	.b	.a	.a	.a
	.c	0.599; 0.116	-0.237; 0.570	-0.537; 0.169
Estonia	.b	.a	.a	.a
	.c	0.685; 0.06	0.757*; 0.04	-0.021; 0.96
France	.b	.a	.a	.a
	.c	0.612; 0.106	-0.395; 0.332	-0.488; 0.218
United Kingdom	.b	.a	.a	.a
	.c	-0.005; 0.993	-0.4073; 0.316	-0.170; 0.715
Hungary	.b	.a	.a	.a
	.c	-0.560; 0.148	-0.568; 0.141	-0.229; 0.584
Italy	.b	.a	.a	.a
	.c	0.922**; 0.002	0.839**; 0.009	-0.362; 0.378
Montenegro	.b	.a	.a	.a
	.c	.a	.a	.a
Netherlands	.b	.a	.a	.a
	.c	.a	0.277; * 0.505	-0.285; 0.493
Poland	.b	.a	.a	.a
	.c	0.730*; 0.03	0.711*; 0.04	-0.67; 0.06
Romania	.b	-0.090; 0.942	0.003; 0.997	-0.499; 0.666
	.c	-0.751*; 0.031	-0.836**; 0.009	0.218; 0.603
Sweden	.b	.a	.a	.a
	.c	-0.8673; 0.132	0.052; 0.902	-0.588; 0.125
Turkey	.b	0.232; 0.467	-0.38; 0.218	0.177; 0.581
	.c	0.896**; 0.002	-0.0395; 0.925	0.867**; 0.005

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

b. Investment in transport with private participation (current US$)

c. Participation transport services (% of commercial service exports)

Furthermore, it was occurred that there is a correlation between railway goods transported and participation transport services (% of commercial service exports) in Croatia, Bulgaria and Italy. Table 1 presents the results which there is any relation between railway passengers carried and investment in transport with private participation, participation transport services (% of commercial service exports). The only two countries in Europe which involves Macedonia and Turkey, there is a positive relationship between the rail lines and participation transport services (% of commercial service exports).

Table 2 has been investigated whether there is a relationship between the railway transportation and investment in transport with private participation, participation transport services in Asia.

Table 2. Correlations between railway transportation and investment in transport with private participation, participation transport services in Asia

Country Name	Correlation	Railways, goods transported (million ton-km)	Railways, passengers carried (million passenger-km)	Rail lines (total route-km)
China	.b	0.229; 0.305	0.196; 0.381	0.341; 0.119
	.c	0.199; 0.636	0.180; 0.668	-0.461; 0.25
India	.b	0.868**; 0.005	0.873**; 0.005	0.872**; 0.005
	.c	-0.257; 0.537	-0.207; 0.621	0.083; 0.843
Russian Federation	.b	0.340; 0.409	-0.917**; 0.001	-0.298; 0.472
	.c	-0.309; 0.455	-0.595; 0.119	-0.022; 0.957
Japan	.b	.a	.a	.a
	.c	0.607; 0.109	-0.0660; 0.876	-0.149; 0.724

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

b. Investment in transport with private participation (current US$)

c. participation transport services (% of commercial service exports)

Table 2 clarified that there is a positive relevance between the railway goods, passenger transportation, rail lines and investment in transport with private participation in India and between railway passenger transportation investments in transport with private participation in Russia. Correlation coefficient (r) is appeared to be significant at the 0.01 level and in the same direction in India and Russia.

Table 3 has been analyzed whether there is a relationship between the railway transportation and investment in transport with private participation, participation transport services in Africa.

Table 3. Correlations between railway transportation and investment in transport with private participation, participation transport services in Africa

Country Name	Correlation	Railways, goods transported (million ton-km)	Railways, passengers carried (million passenger-km)	Rail lines (total route-km)
South Africa	.b	0.1396; 0.741	-0.0157; 0.979	-0.282; 0.497
	.c	0.268; 0.520	0.742; 0.257	0.5115; 0.195

b. Investment in transport with private participation (current US$)

c. Participation transport services (% of commercial service exports)

In Table 3, it was founded any positive relationship between the railway goods, passenger transportation, rail lines and investment in transport with private participation, participation transport services (% of commercial service exports) in South Africa.

Table 4 has been resolved whether there is a relationship between the railway transportation and investment in transport with private participation, participation transport services in America.

In Table 4, 6 countries in American continent were selected which are in the railway privatization process. It was indicated positive relationship between the railway goods transportation and participation transport services (% of commercial service exports).

Table 4. Correlations between railway transportation and investment in transport with private participation, participation transport services in America

Country Name	Correlation	Railways, goods transported (million ton-km)	Railways, passengers carried (million passenger-km)	Rail lines (total route-km)
Brazil	.b	0.504; 0.28	.a	0.375; 0.229
	.c	-0.884**; 0.04	.a	-0.884**; 0.08
Argentina	.b	0.562; 0.147	0.610; 0.39	0.436; 0.28
	.c	0.603; 0.152	-0.978; 0.133	0.742*; 0.035
Canada	.b	.a	.a	.a
	.c	0.57; 0.13	-0.07; 0.85	0.26; 0.52
Chile	.b	0.235; 0.36	-0.003; 0.99	0.115; 0.719
	.c	0.3461; 0.400	0.3205; 0.438	0.546; 0.161
Mexico	.b	0.418; 0.120	0.135; 0.536	0.207; 0.457
	.c	0.244; 0.639	0.846**; 0.008	-0.687; 0.059
United States	.b	.a	.a	.a
	.c	0.913**; 0.001	0.418; 0.302	0.1257; 0.766

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

b. Investment in transport with private participation (current US$)

c. participation transport services (% of commercial service exports)

Table 5 has been researched whether there is a relationship between the railway transportation and investment in transport with private participation, participation transport services in Australia.

Table 5. Correlations between railway transportation and investment in transport with private participation, participation transport services in Australia

Country	Correlation	Railways, goods transported (million ton-km)	Railways, passengers carried (million passenger-km)	Rail lines (total route-km)
Australia	.b	.a	.a	.a
	.c	-0.74; 0.36	-0.75; 0.08	0.65; 0.08

a. Cannot be computed because at least one of the variables is constant.

b. Investment in transport with private participation (current US$)

c. Participation transport services (% of commercial service exports)

In Table 5, it was discovered any positive relationship between the railway goods, passenger transportation, rail lines and investment in transport with private participation, participation transport services (% of commercial service exports) in Australia.

4. Conclusion and Future Research

Railway infrastructure management and railway restructuring have been proceeding since in 1990, nevertheless they are situated at the starting point in the reorganizing process of Europe. Long preparatory periods are necessary for description of prerequisites for liberalization of the railway market. This paper has highlighted some difficulties. Limitation is the geographical, demographic and institutional differences between countries.

The analyses showed statistically significant interaction effects between railways transportation and transport services (% of commercial service exports) and investment in transport with private participation. The analysis explains the relationship between the State and the rail enterprises, network access conditions. One of our first findings in all the results was that railways goods transportation seems to have a significant relationship with participation transport services in Croatia, Bulgaria, Switzerland, Italy, Turkey and United States. These tables show that the transport services main effect is significant for railway transportation. Railways passengers carried main effect is highly significant for investment in transport with private participation in India and Russia. The direct relationships between rail lines and participation transport services (% of commercial service exports) are very promising in Macedonia and Turkey. Also railways lines are positively related to investment in transport in India.

In the regression analysis, our empirical results indicate that railways goods transported has direct, positive effects on transport services (% of commercial service exports) in Croatia and Switzerland. 88% of the change in railways goods transported in Croatia and 97 % of the change in railways goods transported in Switzerland is explained by transport services (% of commercial service exports). In Russian Federation rises highlight investment in transport with private participation as the most important factor for railways transportation. In investment in transport with private participation affected a positive direction in railways goods and passenger transportation in Russian Federation.

The government must encourage private sector in order to enhance the transportation market. However, Cetin (2016) found that from the 1970 to 2011, domestic credit to private sector has significant negative effect on Turkey's economic growth. The most significant issue is the government must transfer the funds to productive sector such as railway transportation to ensure steady economic growth. The appropriate route has to be determined by experts of government through operational research. Thus, transportation sector triggers economic growth notably in railway transportation.

In conclusion, rail transportation liberalization can encourage private companies to enter in the railway markets, enforce competition and increase efficiency. Results provide support to our theoretical discussion that the actual level of railway market opening is still restricted. Overall, this study provided additional insight into the growing field of the relationships between railways transportation and transport services (% of commercial service exports) and investment in transport with private participation.

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